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C14–C/CM–102

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BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—2017
DCE—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS—I

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Resolve $\frac{1}{(x \quad 5)(x \quad 7)}$ into partial fractions.

2. If $\begin{matrix} x & 3 \\ z & 2 \end{matrix} \quad \begin{matrix} x & 4y \\ x & z \end{matrix} \quad \begin{matrix} 5 & 2 \\ 4 & 4 \end{matrix}$, find x, y, z.

3. Evaluate $\begin{matrix} a & h & g \\ h & b & f \\ g & f & c \end{matrix}$.

4. Prove that $\sin^2 45 \quad \sin^2 15 \quad \frac{\sqrt{3}}{4}$.

5. Show that $\frac{\tan 2}{1 \quad \sec 2} \quad \tan$.

6. Express $\dfrac{2 \quad 5i}{4 \quad 3i}$ in the form of $a \quad ib$.

7. Find the equation of the straight line passing through (3, 4) and perpendicular to the line $x \quad y \quad 1 \quad 0$.

8. Find the equation of the point circle whose centre is (3, 4).

9. Evaluate :

$$\lim_{x \quad 0} \frac{\sin 7x}{\sin 11x}$$

10. Find the derivative $e^{3x} \sin 2x$ of with respect to x.

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Show that $\begin{matrix} a & a^2 & a^3 \\ b & b^2 & b^3 \\ c & c^2 & c^3 \end{matrix} \quad abc(a \quad b)(b \quad c)(c \quad a)$.

(b) Solve the equations by Cramer's rule

$$x \quad 2y \quad z \quad 1,\ 2x \quad y \quad 2z \quad 1,\ x \quad y \quad z \quad 2$$

12. *(a)* If $A \quad B \quad C \quad 180$, then prove that

$$\cos 2A \quad \cos 2B \quad \cos 2C \quad 1 \quad 4\cos A \cos B \cos C$$

(b) Prove that $\tan^{1}\dfrac{1}{4} \quad \tan^{1}\dfrac{3}{5} \quad \dfrac{}{4}$.

13. *(a)* Sole the equation $2\sin^2 \quad \sin \quad 1 \quad 0$.

(b) In any triangle ABC, prove that

$$\sin A \quad \sin B \quad \sin C \quad \frac{S}{R}$$

14. *(a)* Find the vertex, focus, directrix, axis and length of latus rectum of the parabola $y^2 \quad 16x$.

(b) Find the equation of the ellipse, eccentricity $\frac{1}{2}$ whose focus is the point (3, 1) and directrix is the lien $x \quad y \quad 6 \quad 0$.

15. *(a)* Find $\frac{dy}{dx}$ if $y \quad (\sin x)^{\tan x}$.

(b) If $y \quad \sqrt{\sin x \quad \sqrt{\sin x \quad \sqrt{\sin x \quad \cdots}}}$ terms, show that

$$\frac{dy}{dx} \quad \frac{\cos x}{2y \quad 1}$$

16. *(a)* If $y \quad \log(x \quad \sqrt{1 \quad x^2})$, show that $(1 \quad x^2)y_2 \quad xy_1 \quad 0$.

(b) If $u \quad \sin^{\ 1}\frac{x^2 \quad y^2}{x \quad y}$, show that $x\frac{u}{x} \quad y\frac{u}{y} \quad \tan u$.

17. *(a)* Find the lengths of the tangent, normal, sub-tangent and sub-normal to the curve $y \quad x^3 \quad 2x^2 \quad 4$ at (2, 4).

(b) The radius of a circle is increasing at the rate of 2 cm/sec. Find the rate of change of area when the radius is 24 cm.

18. *(a)* Find the maximum and minimum values of

$$2x^3 \quad 9x^2 \quad 12x \quad 15$$

(b) Find the approximate value of $\sqrt[3]{123}$.

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